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ABSTRACT

Med-Start is a 5-week program that encourages rural, minority, and economically disadvantaged high school seniors throughout Arizona to pursue careers in the health professions. In order to assist these students in making the transition from high school to college and then to professional school, Med-Start provides academic coursework and seeks to help students enhance critical thinking skills. In past years, one course, a Cultures of Medicine class, has required students to complete technology-based assignments. After several years, instructors had been unable to document any change in students' critical thinking as a result of the course, and student discontent with the course was obvious. The redesign of the course was undertaken to achieve enhanced critical thinking through the use of technology. Using the framework of pragmatic constructivism (Cobb, 2002) to guide the instructional design process, course developers created a 7.5 hour course. This framework supported an instructional design approach that considered the technological environment, the student learning process, and the teacher's role within this environment while allowing for ongoing evaluation and revision of the course. Within this framework, using results for 2 classes of 60 students each, it was determined that a learning environment can be created in which technology enhances students' critical thinking skills in a relatively short time. (Author/SLD)

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Cultures of Medicine: A Technology Based Learning Environment to Enhance Critical Thinking Skills

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Abstract

Med-Start is a five-week program that encourages rural, minority and economically disadvantaged high school seniors from throughout Arizona to pursue careers in the health professions. In order to assist these students in making the transition from high school to college and then to professional school, Med-Start provides academic coursework and seeks to help students enhance critical thinking skills. In past years, one course required students to complete technology-based assignments. After several years, instructors of this course had been unable to document any change in students' critical thinking as a result of the course and student discontent with the course was obvious. Consequently, the authors were asked to redesign the course to achieve enhanced critical thinking through use of technology. Using the framework of pragmatic constructivism (Cobb, 2002) to guide the instructional design process, a 7.5 hour course was created. This framework supported an instructional design approach that considered the technological environment, the student learning process, the teachers' role within this environment and allowed for on-going evaluation and revision of the course. Within this framework, it was determined that a learning environment can be created in which technology enhances students' critical thinking skills in a relatively short period of time.

Introduction

Traditionally, low numbers of minority students are accepted in health professions programs in Arizona. To address this issue, the Med-Start program was developed to assist minority students in making the transition from high school to college and then to professional school by providing academic coursework in a variety of subjects. Rather than simply providing additional content, this coursework was intended to serve as a vehicle for helping students enhance their critical thinking skills. From 1992-2000 students enrolled in the program took a credit bearing English composition course, and participated in chemistry laboratory activities and sessions that taught computer skills. While it was determined that the chemistry activities and composition course contributed meaningfully to students' critical thinking skills, the same could not be said about the computer sessions. In addition, students expressed great frustration and discontent with the computer classes citing boredom and the repetitive and unoriginal nature of the activities. As a result of student discontent and the recognition that these activities were not contributing to students' critical thinking skills, the program director asked the authors to design a 7.5 hour class that used technology and placed emphasis on critical thinking. The resulting class was called The Cultures of Medicine. The class met one day a week over a five-week period. Each class session was 90 minutes long. There were three sections of the class, each with 20 students. Students did not receive credit for this course and all evaluation was in the form of informal feedback rather than grades. Our goal as we designed and implemented the Cultures of Medicine class was to better understand how students, teacher and a technology based program interact within this particular learning environment and how this interaction contributes to the academic goal of enhancing critical thinking skills in a very short period of time.

Framework

Pragmatic constructivism (Cobb, 2002) provided an orientation within which to conceptualize issues of instructional design, learning and teaching. In the case of the Cultures of Medicine class, we wanted to structure a classroom environment in which students could enhance their critical thinking skills, in which technology was used as a means to organize student learning, and in which the teacher assumed the role of facilitator.

Educators have recognized that a variety of tools from textbooks to discussion to laboratory equipment can be used to structure any classroom into an environment in which students will engage in a process of making connections, taking into account multiple criteria and reflection – processes referred to as critical thinking (Resnick, 1987). Recently, computer and internet technology have become two popular tools for achieving this purpose. However, in our experience, the simple presence of these tools in a classroom does not result in an environment conducive to critical thinking. If critical thinking is to take place, the use of computers and internet technology in the classroom environment must be incorporated in such a way that they assist the teacher and the student community in establishing practices that will enhance and support critical thinking. In the Cultures of Medicine class, a website with four different modules was used to provide some of this structure and richness to the learning environment while the teacher further facilitated the students' learning process.

Design research (Cobb & Bowers, 1999) provided the means to think about how to sequence the program modules and how the teacher would support student thinking as they proceeded through the activities. Our assertions about the design of the activities within the program and instructional practice evolved together and informed each other. This design research cycle then informed the revision and increasing effectiveness of this particular classroom environment.

Instructional Design

In the first year of the Cultures of Medicine class, a course website was developed to provide students with an environment in which they could explore different cultural perspectives on health and healing. The site consisted of four modules each of which focused on a different aspect of health and healing. The modules guided students through a variety of activities including personal reflection, partner and small group discussion, and critical reading of a variety of resources. These activities were designed to help students first articulate their own beliefs about health and healing and then analyze and evaluate these beliefs in the context of ancient and modern cultures. For example, the first module gave students a scenario that helped them to create a statement of their own beliefs about health, treatments for illness, and characteristics important in a healer. Students then wrote an essay addressing the following questions: In the 21st century, what does it mean to be healthy? What is the best or most appropriate way to treat a person who is not healthy? What are the qualities or characteristics that a healer must have in order to be a good healer?

The second module asked students to complete a series of readings in order to examine different cultures' beliefs about the causes of a specific disease. Students then returned to their personal statements about health and sickness and examined how their experience had shaped these beliefs. The third module provided resources for students to investigate ancient and modern methods of healing and then reflect on the origins and efficacy of treatments they identified in their own belief statements. The fourth module presented students with sketches of several healers and asked them to select the best healer and defend their choice. Students were then given the opportunity to synthesize their beliefs on health and healing by creating their own version of the Hippocratic Oath. Finally, students were asked to use the knowledge they had gained during the previous classes to refine or recreate their initial answer to the three questions about health and healing.

Methods – Year 1

All students were asked to complete a brief Computer Use Survey asking them about their level of computer experience and ways they had used computers in and out of school. A trained observer sat in each class session, listened to partner and small group discussions and took notes on the quality of student discussion and changes in students' conceptions of health. At the end of the course, the instructor was interviewed about her role and interaction with students during the course.

The analysis of the students' discussion was guided by the results of Marton and Saljio's (1976) investigations into students' approaches to learning which posited two basic approaches to learning. The first is "surface learning" which is described as acquiring knowledge, memorizing for later reproduction and using what we know. The second approach is referred to as "deep learning." With this approach, students take different perspectives and work to develop an understanding of concepts. Thus, deep learning is a process of developing insights about new concepts and connecting these insights with larger ideas. These descriptions of deep learning reflect what educators refer to as critical thinking (Resnick, 1987). Using these definitions, observer notes were analyzed and student contributions were identified as superficial or deep. Superficial contributions included stating an opinion without providing support, making a statement without providing explanation or elaboration, and reproducing facts. Deep contributions included making connections between ideas and opinions, connecting concepts to larger ideas, using different perspectives to develop understanding, and reflecting on and analyzing ideas.

In addition, students' initial and final essays were collected and analyzed using Hounsell's (1984) conceptions of the nature of the essay. Hounsell's work used students' writing to document depth of thinking. These conceptions focus on three major elements of an essay: interpretation, organization and data. In the first level, essay as argument, interpretation is central. Students are able to synthesize a range of ideas or concepts into a single interpretation or conclusion. Organization is used to create a logical and coherent argument. Data is then used to support or authenticate the argument. In the second level, essay as viewpoint, the writer expresses a single point of view. In these essays, the element of organization exists but does not explicitly support the point of view. The use of data to support the argument is relatively lacking. In the third level of essay, essay as arrangement, data is presented as discrete facts not connected to a central argument or conclusion. Organization focuses on "covering the material" as opposed to developing or supporting an argument. Interpretation is lacking in these essays.

Results – Year 1

The Computer Use Survey indicated 17 students (28.3%) began the course with no computer experience beyond word processing. While 43 students (71.7%) had some experience using the internet for educational purposes, all of these students stated that they used the internet to find facts.

Analysis of observer notes demonstrated that student contributions to small group and partner discussions were generally surface-level. Discussions consisted primarily of students stating their individual opinions without considering connections between these opinions or between the stated opinions and the assigned readings. When students did bring the readings into a discussion, it was to restate or summarize information from the reading. Student conversations tended to be brief with each student stating a single disconnected or isolated idea or fact and then

letting another student take his/her turn. Observer notes indicated that students rarely supported or explained their opinions, took different perspectives or reflected on an idea that was presented.

Observer notes also indicated students' conceptions of health remained largely unchanged. These conceptions were based primarily on personal experience. While students shared their different experiences with one another, this sharing of information did not result in new or different views of health, healing and medicine.

The interview with the instructor revealed that the use of technology freed her from managerial tasks such as lesson organization and pacing. This allowed her to instead interact with individuals and small groups of students to guide small group discussions, question students and encourage them to explain their conclusions and question other group members. The instructor also indicated students appeared to be interested in the activities and readings and most students participated in all of the activities and discussions. She stated that while students did participate in partner and small group discussions, these discussions tended to be brief. Students seldom engaged one another in thoughtful debate about the issues. Instead they had a "quick sharing of ideas" and then moved back to their computers to work on individual writing assignments. Students would engage in more thoughtful discussions if the instructor was present to ask questions, probe their responses and provide guidance for relating the readings to the discussion but would not sustain this level of discussion when the instructor was not present.

Analysis of initial essays demonstrated all students' writing was at the level of essay as arrangement. Students did not state or develop an argument but instead worked to "cover" the questions. Each student wrote at least one paragraph or sentence addressing each of the three issues presented in the questions. They presented information as discrete, unconnected ideas not related to a central theme. These essays did not contain any interpretation. One student numbered her responses according to the three issues addressed in the question. Another student stated, "I know first hand what it means to be healthy. A well balanced diet, a good night's rest, working out or staying active, and taking daily vitamins all add up to a healthy body." This student did not explain the basis for this opinion or provide examples or relevant illustrations to support this conclusion. She then went on to say, "For a person to be qualified as a good healer, they must be open and understanding," but made no attempt to consider the relationship between these two statements.

Final essays indicated 26 students (43.33%) writing moved to the level of essay as viewpoint. These students' final essays expressed a single point of view but demonstrated limited use of data to support that view. Students acknowledged the integration of the three issues presented in the questions but when writing about these issues used the organization imposed by the questions. For example, one student began by stating, "Being healthy is a process that involves both the patient and the doctor." She then went on to discuss the roll of the patient followed by a discussion of the role of the doctor. She provided illustrations but did not clearly connect them to her thesis. Another student stated, "Being healthy means having a well balanced life both physically and mentally...As ancient healers believed, maintaining a personal level of balance, being aware of surroundings and even the weather and the people you come into contact with can effect your health." This student clearly stated her viewpoint and then went on to discuss each of the related issues. Examples are given to illustrate her point but do not explicitly relate to her conclusion. The essay was clearly organized but the organization did not support the point of view.

No student's writing achieved the level of essay as argument. The writing of 34 students (56.66%) remained at the level of essay as arrangement.

Discussion and Revision – Year 1

Analysis of data collected during the first year of the Cultures of Medicine class revealed that a meaningful change in students' critical thinking skills could be accomplished over a very short period of time. In this class, technology was used as an instructional tool to provide students with access to the content they were expected to learn and guide them through a learning process. While student writing demonstrated that critical thinking of 26 students was enhanced, observations and instructor comments indicated the depth of thinking evident in student writing was not present in classroom discussions. Instructor comments indicated that while students were capable of questioning one another, and reflecting on and evaluating other students' conclusions, they did not engage in this type of sustained critical thinking unless the instructor was present and actively eliciting such thinking of the group. In addition, students' references to the reading during discussion revealed that a majority of students continued to believe that internet resources supplied facts that were beyond interpretation or discussion.

While we were pleased with students' enhanced critical thinking as indicated by the increase in depth of thinking in student essays, we were concerned that this depth of thinking was not seen in student discussions unless the discussion was being guided by the course instructor. We were also concerned that students' did not appear to be using this depth of thinking when reading and referring to resources from the internet.

In order to address these concerns and strengthen the Cultures of Medicine class, revisions were made to the course website and class structure before the class was offered again. Modules were redesigned to provide specific guidelines for student discussion. These guidelines mirrored the type of scaffolding the instructor had provided to groups in order to elicit deeper thinking. For example, discussion guidelines added to the first module led students through a process of sharing their opinions, elaborating on those opinions, asking questions to begin to analyze and evaluate the opinions that had been shared, and then developing some sort of group conclusion or consensus. Additional readings that provided broader and sometimes conflicting perspectives were added to each of the modules. Guidelines for discussion required students to address these inconsistencies in their discussion and to consider reasons for such inconsistencies. Finally, the structure of the class was also changed to allow time for a large group discussion following the small group discussions. The instructor took responsibility for facilitating this discussion and used it as an opportunity to have students compare and contrast their conclusions and to explore reasons and explanations for the groups' different conclusions.

Results – Year 2

The Computer Use Survey administered at the beginning of the course indicated students in the class during the second year had similar computer experience to students in the class the previous year. Sixteen students (26.66%) began the course with no computer experience beyond word processing. Forty-four students (73.33%) had experience using the internet for educational purposes and a majority of these students referred to using the internet to find facts.

Analysis of observer notes indicated that student discussions during the first class session tended to be brief and surface-level. However, when the instructor referred students back to the module instructions for elaborating on and analyzing the opinions presented in the groups and modeled this process using an example from his own experience, students began to engage on a deeper level. During later discussions, students were able to compare and contrast the various opinions within the group and considered reasons for these similarities and differences. In small

group discussions, students assumed the perspective of the culture they were reading about and used this perspective to analyze both ancient and modern practices.

Observer notes also indicated that students' conceptions of health changed significantly throughout the course. Initial conceptions, like those in the previous year, focused primarily on personal experience. As the course progressed, students began to incorporate ideas presented in the readings and by other students into their personal conceptions of health and healing. In addition, students acknowledged the variety of factors influencing these conceptions. These broader conceptions were most evident in student discussion surrounding the creation of a Hippocratic Oath. As students worked to create an Oath, they incorporated ideas from previous discussions, analyzed the relationship between ideas included in their Oath and their vision of what it means to be a healer, and worked to arrive at group consensus about what should and should not be included in the Oath.

The interview with the instructor indicated the use of technology, as in the previous year, freed him from managerial tasks and allowed him to act as a facilitator. The guidelines for student discussion gave him a tool to help students quickly understand what was expected of them during discussion. The discussions tended to be longer and more in-depth and students were engaged with one another even if the instructor was not working directly with their group. In addition, the instructor did not feel he had to participate in a discussion in order for students to engage on a deeper level. He was free to listen to groups and work with those groups who seemed to be having more difficulty while other groups could move ahead without his assistance. The large group discussions gave students the opportunity to see the range of ideas that had been shared in small groups. During the large group discussions, the instructor acted as a facilitator encouraging students to elaborate and support the conclusions they were sharing. The instructor did note that by the end of the class, students were able to do this more often without his prompting.

Initial essays demonstrated that, as in the previous year, all students' writing began at the level of essay as arrangement. Students worked to cover the questions. While most students addressed each of the issues presented, the essays included no interpretation. Several students numbered their responses to correspond to the three issues addressed in the question. Students did not explain opinions, provide relevant examples or illustrations, or consider the relationship between the ideas presented in their essays.

Final essays indicated that the writing of 30 students (50%), a slightly higher number than Year 1, moved to the level of essay as viewpoint. Students' essays presented a clear point of view and acknowledged the integration of the three issues presented in the questions, but did not use organization to create a logical argument. Most students simply used the organization imposed by the question. Students used examples to illustrate their views but the examples were not explicitly related to their conclusions. No students' writing achieved the level of essay as argument. Fifty percent of the students' writing remained at the level of essay as arrangement.

Discussion and Implications

Pragmatic constructivism (Cobb, 2002) and design research inform much current work in curriculum inquiry in math and science (Cobb, Yackel, & Wood, 1992). While the Cultures of Medicine class is not a math or science course, this framework offered us the opportunity to consider the interaction between students, teacher, technology and the learning environment and the impact this interaction had on student learning. In addition, the framework provided a context within which to observe and evaluate the course and make meaningful revisions for future years.

Evaluation of the first year of the Cultures of Medicine course revealed that the critical thinking skills of 26 students (43.3%), as demonstrated in their writing assignments, did improve as a result of their participation in the course. This change, however, was not evident in small group discussions or in a deepening of students' conceptions of medicine. For this reason, the computer modules were restructured to provide substantially more guidance and instruction in order to encourage students to use critical thinking skills during small group discussions in addition to individual writing assignments. In addition, the instructor instituted large group discussions that provided students with the opportunity to see the breadth of information discussed in the small groups. As a result of these changes, students in the second year of the course were consistently engaged in a process of comparing and contrasting opinions presented within the groups, considering reasons for these differences, and analyzing the perspectives and practices of the cultures they were reading about, even without explicit guidance from the instructor. These discussions also demonstrated students' conceptions of medicine became more complex as the course progressed and students began to incorporate other ideas and acknowledge the variety of factors influencing these conceptions.

In the second year of the program, 30 (50%) of the students demonstrated increased critical thinking skills in their writing assignments, a slightly higher number than in the previous year. While the percentage of students whose critical thinking as demonstrated by their writing increased, no students' writing moved beyond the level of essay as viewpoint. This is most likely due to the fact that while modules were changed to elicit critical thinking during discussion, writing assignments remained largely unchanged. This indicates that students do not necessarily transfer their ability to use critical thinking in a discussion to their written work. For this reason, it is important to consider explicit instructions and guidelines for writing assignments that will help students to transfer these skills. In addition, it is important to further investigate the connection between students' critical thinking skills and their writing abilities.

As the course moves into its third year, we do not anticipate any major changes in instructional design. The Cultures of Medicine course has succeeded in enhancing students' critical thinking skills as demonstrated by their writing and their conceptions of health. While students' writing has not demonstrated the highest level of critical thinking, we believe that this may be more an issue of writing ability than critical thinking ability. Unfortunately, students' writing ability cannot be meaningfully addressed in the limited amount of time available for this course.

This project indicates that critical thinking can be enhanced in a short period of time through the use of technology. However, if we are to achieve this goal in other classrooms, courses must be designed within a framework that considers the role of teacher, student and technology in a classroom environment and that allows for continuing evaluation and thoughtful revision based on the results of this evaluation.

References

Cobb, P. (2002). Theories of knowledge and instructional design: A response to Colliver. Teaching and learning in medicine, 14 (1), 52-55.

Cobb, P. & Bowers, J. (1999). Cognitive and situated learning perspectives in theory and practice. Educational Researcher, 28, (2), 4-15.

Cobb, P., Yackel, E. & Wood, T. (1992). A constructivist alternative to the representational view of mind in mathematics education. Journal for research in mathematics education, 23, (1), 2-34.

Hounsell, D. (1984). Learning and essay-writing. In F. Marton, D. Hounsell & N. Entwistle (Eds.), The experience of learning (pp. 103-123). Edinburgh: Scottish Academic Press.

Marton, F. & Saljio, R. (1976). On qualitative differences in learning I: Outcome and process. British Journal of Educational Psychology, 46, 4-11.

Resnick, L. (1987). Education and learning to think. Washington, DC: National Academy Press.